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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/564,832

01/17/2006

Robert Fischer

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21171 7590 06/10/2010  
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EXAMINER

HASSAN, SARAH

ART UNIT

PAPER NUMBER

2611

MAIL DATE

DELIVERY MODE

06/10/2010

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/564,832	<b>Applicant(s)</b> FISCHER ET AL.	
	<b>Examiner</b> SARAH HASSAN	<b>Art Unit</b> 2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 21 November 2009.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 4-7 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 4, 6-7 is/are rejected.
- 7) ☒ Claim(s) 5 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)                        | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

1. In view of the appeal brief filed on 1/4/10, PROSECUTION IS HEREBY REOPENED. A new ground of rejection is set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) initiate a new appeal by filing a notice of appeal under 37 CFR 41.31 followed by an appeal brief under 37 CFR 41.37. The previously paid notice of appeal fee and appeal brief fee can be applied to the new appeal. If, however, the appeal fees set forth in 37 CFR 41.20 have been increased since they were previously paid, then appellant must pay the difference between the increased fees and the amount previously paid.

A Supervisory Patent Examiner (SPE) has approved of reopening prosecution by signing below:

/Mohammad H Ghayour/

Supervisory Patent Examiner, Art Unit 2611.

***Allowable Subject Matter***

2. Claim 5 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. **Claim 4, 6-7 rejected under 35 U.S.C. 103(a) as being unpatentable over Fischer et al, "Space-Time Transmission using Tomlinson-Harashima Precoding" Proceedings of 4<sup>th</sup> International ITG Conference on Source and Channel Coding, January 2002, pp. 139-147 in view of Ginis et al, "A Multi-user Precoding Scheme achieving Crosstalk Cancellation with Application to DSL Systems," IEEE document, 2000, pp 1627-1631.**

5. Fischer teaches "A nonlinear precoding method" [see page 139, 'Abstract'] "based on modulo arithmetic" [see page 142, second column] "for the transmit-side preequalization of K user signals to be transmitted concurrently using a frequency in a digital broadcast channel" [see page 142, Figure 4; page 143, 1<sup>st</sup> column, 3<sup>rd</sup> paragraph] "with known transmission behavior set up between a central transmitting station and K decentralized, non-interconnected receiving stations" [see page.145, 2<sup>nd</sup>

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column, 4<sup>th</sup> paragraph]. Fishcer discloses Tomlinson Harashima precoding method which is a nonlinear precoding method based on modulo arithmetic. Fischer discloses the spatial equalization or "preequalization" at the transmitter. Tomlinson Harashima is used in the digital broadcast channel because a plurality of user signal present at common transmitter is digitally transmitted to plurality of decentralized receivers as detailed in page 145, 2<sup>nd</sup> column, 4<sup>th</sup> paragraph.

6. "the user signals consisting of data symbols  $a_k$  with  $k$  from 1 to  $K$  from a signal constellation having  $M_k$  levels and a signal point spacing  $A_k$  with a periodic multiple representation of the undisturbed transmitted data symbols  $a_k$  in data symbol intervals congruent for  $K$  receive-side modulo decision devices" [see page 143, column 1, paragraph 4], "a transmit-power minimizing selection of representatives  $v_k$  from the range of values  $a_k + A_k M_k' z_{kk}$  where  $Z_{kk}$  are integers, and linear preequalization of the selected representatives  $v_k$  to form transmit signals  $x_k$  to be transmitted" [see page 143, col. 1, 6<sup>th</sup> paragraph].

7. "eliminating the interference symbols by the  $K$  receive-side modulo decision devices" [see page 146, column 1, 3<sup>rd</sup> paragraph].

8. It should be noted however that Fischer does not specifically teach "including interference symbols in the digital broadcast channel superimposed on the data symbols  $a_k$  and periodic multiple representation thereof due to cross-coupled user signals by an adapted periodic multiple representation, the interference symbols between the data symbol  $a_l$  with  $l$  from 1 to  $K$  and not equal to  $k$  and the data symbol

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$a_k$  being assigned periodic representatives from a range of values  $A_k'M_k'z_{\sim k}$  where  $z_{\sim k}$  are integers”

9. On the other hand, Ginis teaches “including interference symbols in the digital broadcast channel superimposed on the data symbols  $a_k$  and periodic multiple representation thereof due to cross-coupled user signals by an adapted periodic multiple representation, the interference symbols between the data symbol  $a_{\sim}$  with  $l$  from 1 to  $K$  and not equal to  $k$  and the data symbol  $a_k$  being assigned periodic representatives from a range of values  $A_k'M_k'z_{\sim k}$  where  $z_{\sim k}$  are integers” [see page 1627, ‘Abstract’, ‘Introduction’ 1<sup>st</sup> paragraph, see page 1627, equation 1]. Ginis discloses a TH precoder method capable of achieving cross talk cancellation or “periodic multiple representation thereof due to cross-coupled user signals.” In addition, Ginis discloses TH-precoder as an ISI or “interference symbols” mitigation unit.

10. It would have been obvious to one of ordinary skill in the art to combine the teachings of Fischer with the teachings of Ginis because Ginis discloses a Tomlinson Harashima precoding method that can also be applied to DSL with significant performance gains as detailed in ‘Abstract’ on page 1627, and ‘Conclusion’ on page 1631.

11. As to claims 6 and 7, Fischer teaches “nonlinear precoding method” [see page 139, ‘Abstract’].

12. “offset compensation is already carried out on the transmit signals  $x_k$  prior to transmission” [see page 142, Figure 4; page 143, 1<sup>st</sup> column, 3<sup>rd</sup> paragraph].

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SARAH HASSAN whose telephone number is (571)270-3456. The examiner can normally be reached on Monday through Friday (available 8:00 AM - 5:00PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on (571)272-3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Mohammad H Ghayour/  
Supervisory Patent Examiner, Art  
Unit 2611

/Sarah Hassan/  
Examiner, Art Unit 2611

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